



**OSWEGO**  
STATE UNIVERSITY OF NEW YORK

To: Don Smith

3 Sep 2002

Re: Support of Patent Application: Methods and Mixtures for Treating Distressed Trees

I am an expert on the development and structure of roots of vascular plants, especially flowering plants. The application referred to deals with the effects of growth regulators and required mineral elements of plant growth, as applied through holes *in situ* on the recovery of flowering plant (hardwood) trees like post oaks from various environmental stresses.

The application of a root growth regulator (hormone) in combination with a fertilizer mixture via some kind of spray implement in a hole(s) during *in situ* application represents a significant difference from the patented Mehra-Palta method because the Smith method would necessarily be a different mixture of hormones and minerals since they would be applied to hardwood (flowering plant) roots, not conifers. This is very important because there are small but very important differences between the ectomycorrhizal associations of the conifers (pines, etc.), which Mehra-Palta specifically used in his patented procedure, and the post oaks for which Smith's procedure is designed. These association differences most likely have profound effects upon the growth and meristems of the post oaks that are not typical of the conifers; in addition, the root meristems themselves are quite different in post oaks and would be differently affected by the procedures. I must tell the reviewer that it is not just a reactivation to effect lateral or adventitious rooting that is important here (referred to in some ways by the Green light Rootone and Dale systems and to a very different degree in the Mehra-Palta system), but it is an effect upon already existing meristems and their derived tissues, as well as lateral and even adventitious roots.

Moreover, the Dale and Green Light Rootone procedures, referred to by Jeffrey L. Green, represent different combinations (hormones/minerals) and treatment methods than Smith's application. It is further clear from reading Mehra-Palta, Dale, and Green Light Rootone that those applications had not, in fact, envisioned Smith's method of application and way of use of the plant growth hormones and mineral elements, nor could one reasonably be expected to extend their procedures to the Smith plan and uses. If anything, I cannot understand how Mehra-Palta received a patent on a culture procedure that had been well documented by others for longer than 30 years before his application, and these were different from the Smith application.

Sincerely,

  
James L. Seago, Jr., Ph.D.

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EXHIBIT

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Express Mail Receipt #  
EL 859 422 853 US

## Curriculum Vitae of JAMES L. SEAGO, JR.

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### Education

B.A. 1963. Knox College (Biology), Galesburg, IL.  
M.A. 1966. Miami University (Botany), Oxford, OH.  
Ph.D. 1969. University of Illinois (Botany), Urbana, IL.

### Professional Positions

Assistant Professor of Biology, 1968-1975, SUNY at Oswego.  
Associate Professor of Biology, 1975-1991, SUNY at Oswego.  
Professor of Biology, 1991-, SUNY at Oswego.  
Chair, Department of Biology, 1979-1985, SUNY, College at Oswego.  
Adjunct Faculty, SUNY at Plattsburgh, *In Vitro* Cell Biology & Biotechnology, 1990-92.  
Editorial Board Member, Environmental & Experimental Botany, 1992-.  
Program Director, Developmental & Structural Section, Botanical Society of America, 1994-97.

### Research Publications

Payne, W.W., and J.L. Seago. 1968. The open conduplicate carpel of *Akebia quinata* (Berberidales: Lardizabalaceae). Amer. J. Bot. 55: 575-581.

Seago, J.L., and C. Heimsch. 1969. Apical organization in roots of the Convolvulaceae. Amer. J. Bot. 56: 131-138.

Seago, J.L. 1971. Developmental anatomy in roots of *Ipomoea purpurea*. I. Radicle and primary root. Amer. J. Bot. 58: 604-615.

Seago, J.L. 1973. Developmental anatomy in roots of *Ipomoea purpurea*. II. Initiation and development of secondary roots. Amer. J. Bot. 60: 607-618.

Seago, J.L., and S.M. Wolniak. 1976. Cortical ontogeny in roots. I. *Zea mays*. Amer. J. Bot. 63: 220-225.

Kausch, A.P., J.L. Seago, Jr., and L.C. Marsh. 1981. Changes in starch distribution in the overwintering organs of *Typha latifolia* (Typhaceae). Amer. J. Bot. 877-880.

Seago, J.L., Jr., and L.C. Marsh. 1989. Adventitious root development in *Typha glauca*, with emphasis on the cortex. Amer. J. Bot. 76: 909-923.

Seago, J.L., Jr., and L.C. Marsh. 1990. Origin and development of lateral roots in *Typha glauca*. Amer. J. Bot. 77: 713-721.

Seago, J.L., Jr., C.A. Peterson, and D.E. Enstone. 1999. Cortical ontogeny in roots of the aquatic plant, *Hydrocharis morsus-ranae* L. Can. J. Bot. 77: 113-121.

Seago, J.L., Jr., C.A. Peterson, D.E. Enstone, and C.A. Scholey. 1999. Development of the endodermis and hypodermis of *Typha glauca* Godr. and *T. angustifolia* roots. Can J. Bot. 77: 122-134.

Seago, J.L., Jr., C.A. Peterson, and D.E. Enstone. 2000. Cortical development in roots of the aquatic plant, *Pontederia cordata* L. Amer. J. Bot. 87: 1116-1127.

Seago, J.L., Jr., C.A. Peterson, L.J. Kinsley, and J. Broderick. 2000. Development and structure of the root cortex in *Caltha palustris* L. and *Nymphaea odorata* Ait. Ann. Bot. 85: 631-640.

Seago, J.L., Jr. 2002. The root cortex in the Nymphaeaceae, Cabombaceae, and Nelumbonaceae. J. Torrey Bot. Soc. 129: 1-9.

McManus, H.A., J.L. Seago, Jr., and L.C. Marsh. 2002. Epifluorescent and histochemical aspects of shoot anatomy of *Typha latifolia* L., *Typha angustifolia* L., and *Typha glauca* Godr. Annals of Botany 87: October 2002 Issue.

#### **Teaching Publications**

Seago, J.L. 1977. Teaching beyond the introductory course: Plant anatomy. Plant Science Bulletin 23: 6-8.

Seago, J.L., Jr. 1992. The role of research in undergraduate instruction. American Biology Teacher 54: 401-405.

Seago, J.L., Jr., and J.S. Shipman. 1993. Botany students as scientists. Bioscene Journal of College Biology Teaching 19(3): 16-20.

#### **Manuscripts in Preparation**

Seago, J.L., Jr., and L.C. Marsh. Environmental and population biology: Three decades of a course for non-majors and majors. To be submitted to American Biology Teacher.

Heimsch, C., and J.L. Seago, Jr. Organization of the root apical meristem in flowering plants. To be submitted to American Journal of Botany.

#### **Research in Progress**

Heimsch, C., and J.L. Seago, Jr. The evolution of the organization of the root apical meristem in flowering plants. This is a major study, derived from Charles Heimsch's life-long study of plant roots, which he asked me to assume, which includes my own research on root meristems, and which will be submitted to the American Journal of Botany.

Schreiber, L., K. Hartmann, J.L. Seago, Jr., H.A. McManus, and J. Broderick. Biochemical characterization of the endodermis and hypodermis of rhizomes and roots of *Typha glauca* Godr. Collaborative study with Lukas Schreiber and colleague, Klaus Hartmann, Würzburg, Germany.

Seago, J.L., Jr., and C.A. Peterson. Development and structure of the root cortex of wetland plants from different wetland habitats. Ongoing, long-term studies of many species with Carol Peterson of Waterloo, Ontario; work on *Cyperus alternifolius* nearly completed.

Seago, J.L., Jr., H.A. McManus, Jaime J. Welch, and L.C. Marsh. Development of the rhizomes of *Typha glauca*. A detailed analysis of the cortical tissues of the underground stems resulting from separate undergraduate research projects of Hilary McManus and Jaime Welch.

Reinhardt, A., and J.L. Seago, Jr. Root cortical development in *Canna*, which grows easily in wetland or terrestrial conditions. A study with Angel Reinhardt, a grad student in Education, who grows the plants at a local herb and flower establishment.

**Abstracts of Talks at Professional Meetings (\* = speaker); not refereed**

Seago, J.L.\*. 1967. Apical organization in roots of the Convolvulaceae. Amer. J. Bot. 54:643.

Payne, W.W.\*, and J.L. Seago. 1967. The unsealed carpel of *Akebia quinata* (Lardizabalaceae). Amer. J. Bot. 54: 658-9.

Seago, J.L.\*, C.J. Ciesla, and L.C. Marsh. 1971. Some correlations between tissue development in roots of *Lythrum salicaria* and environment. Amer. J. Bot. 58: 456.

Seago, J.L.\*, S.M. Wolniak, and S.M. Wiatr. 1972. A re-examination of cortical development in roots. Amer. J. Bot. 59: 656.

Seago, J.L.\* 1975. Effects of root cap excision on root and shoot growth in soybean seedlings. Amer. J. Bot. 62(5): 19.

Seago, J.L.\* 1975. A 'problems' approach to the teaching of Plant Kingdom and Plant Anatomy courses. Amer. J. Bot. 62(5): 65.

Kausch, A.P.\*, and J.L. Seago. 1977. A seasonal study of the tissues and organs in *Typha latifolia*: Winter starch distribution. Amer. J. Bot. 64(5): 11-12.

Seago, J.L.\* 1977. Modifications in root apical development and root starch distribution during germination of soybean seedlings. Amer. J. Bot. 64(5): 19.

Seago, J.L.\* 1978. The role of research in undergraduate instruction. Amer. J. Bot. 65(5): 10.

Marsh, L.C., and J.L. Seago, Jr.\* 1983. Adventitious rooting in *Typha glauca* under experimental conditions. Amer. J. Bot. 70(5): 25.

Seago, J.L., Jr.\*, and L.C. Marsh. 1985. Root development in *Typha glauca*. Amer. J. Bot. 72(6): 47.

Seago, J.L., Jr.\* 1988. The origin of aerenchyma in aquatic roots. Amer. J. Bot. 75(6): 47.

Seago, J.L., Jr.\*, and L.C. Marsh. 1989. Origin and development of lateral roots in *Typha glauca*. Amer. J. Bot. 76(6, suppl.): 57.

Seago, J.L., Jr.\* 1990. Root tip growth of adventitious roots of *Chlorophytum comosum*. In aerial, aquatic, and terrestrial conditions. Amer. J. Bot. 77(6, suppl.): 24.

Seago, J.L., Jr.\* 1992. Development of the root cortex. Amer. J. Bot. 79(6, suppl.): 22.

Seago, J.L., Jr.\* 1993. The plant biology student as scientist. Amer. J. Bot. 80(6, suppl.): 190.

Seago, J.L., Jr.\* , C.A. Peterson, and D.E. Enstone. 1994. Fluorescent and histochemical studies of cattail roots. Amer. J. Bot. 81(6, suppl.): 31.

Seago, J.L., Jr.\* , C.A. Peterson, and D.E. Enstone. 1995. Cortex development and structure in roots of *Pontederia cordata*. Amer. J. Bot. 82(6, suppl.): 26.

Seago, J.L., Jr.\* , C.A. Peterson, and D.E. Enstone. 1996. Development and structure of the root cortex in *Nymphoides cordatum*. Amer. J. Bot. 83(6, suppl.): 49.

Myers, C.V.\* , C.J. Kinkaide, J.A. Schneider, and J.L. Seago, Jr. 1997. Effects of lead on early development in *Typha glauca*. Amer. J. Bot. 84(6, suppl.): 51.

Seago, J.L., Jr.\* 1997. The root cortex in the wetland plant, *Nymphaea odorata*. Amer. J. Bot. 84 (6, suppl.): 55.

McManus, H.A.\* , J.L. Seago, Jr., L.C. Marsh, and K.I. Mohamed. 1998. Structural comparison of three *Typha* species: *Typha glauca* and its putative parental species, *T. latifolia* and *T. angustifolia*. Amer. J. Bot. 85(6, suppl.): 15.

Seago, J.L., Jr.\* 1998. Development and structure of the root cortex of the wetland plant, *Caltha palustris*. Amer. J. Bot. 85(6, suppl.): 20.

Seago, J.L., Jr.\* 2000. The root cortex of the water lilies and lotuses. Amer. J. Bot. 87(6, suppl.): 32.

**Talks at Professional Meetings: Abstracts Published only in Meeting Proceedings**

Seago, J.L., Jr. , and L.C. Marsh. 1987. The determinate growth of *Typha glauca*. XIV: 39. International Botanical Congress, Berlin, Germany.

Seago, J.\* 1991. Scientific communication in Environmental and Population Biology. The ASB Bulletin 38(2): 92. Association of Southeast Biologists Annual Meeting, Booneville, NC.

Seago, J.L., Jr.\* , and L. C. Marsh 1987. Initiation and development of lateral roots in *Typha glauca*. 20<sup>th</sup> Plant Development Workshop at Horticultural Research Institute of Canada, Vineland, ON.

Seago, J.L., Jr.\* 1995. Development and structure of the endodermis and hypodermis in *Typha*. 30<sup>th</sup> Plant Development Workshop at University of Waterloo, ON, Canada.

Seago, J.L., Jr.\* 1999. Developmental and structural studies on roots of wetland plants. 33<sup>rd</sup> Plant Development Workshop at University of Guelph, ON, Canada.

Seago, J.L., Jr.\* , and C.A. Peterson. 1999. Endodermis, hypodermis, and permeability in wetland plant roots. XVI: 83. International Botanical Congress, St. Louis, MO.

Seago, J.L., Jr. 2001. Development and structure of the root cortex in *Cyperus alternifolius*. Botanical Society of America, Albuquerque, NM.

Seago, J.L.\* , and C. Heimsch. 2002. Patterns in root apical organization and cortex structure in basal Angiosperms and Dicotyledons. Botanical Society of America, Madison, WI.

Welch, J.\* , B. Doris, J.L. Seago, and L.C. Marsh. 2002. Responses of *Typha glauca* plants to increased salinities. Botanical Society of America, Madison, WI.

#### **Published Book Review**

Seago, J.L., Jr. 1980. Guedes, M. Morphology of seed plants. Plant Science Bulletin 26: 50.

#### **Research Report: Not Refereed**

Seago, J.L., and P.G. Weber. 1975. Vegetation and animal surveys. Chap. 7, p. 93-180, in LOTEL, Research Report No. 195: A biological study of a proposed dredge spoil site in Rochester, NY. Lake Ontario Environmental Laboratory, SUNY, Oswego, NY.

#### **Professional Society Membership and Journals**

Botanical Society of America - American Journal of Botany  
Council on Undergraduate Research - CUR Quarterly  
International Waterlily and Water Gardening Society - Water Garden Journal  
Society of Economic Botany - Economic Botany  
Society of the Sigma Xi - American Scientist  
Torrey Botanical Society - Journal of the Torrey Botanical Society  
Annual Review of Plant Physiology and Plant Molecular Biology  
Environmental and Experimental Botany  
International Journal of Plant Sciences  
WorldWatch

#### **Grants**

State Research Foundation Grant-in-Aid, 1971-2  
NSF Matching Equipment Grant, 1981 (Principal Investigator)  
Experienced Faculty Travel Award of SUNY/UUP to Berlin, 1987  
SUNY Oswego Summer Faculty Research Grant, 1990  
NSF Grant for Root Development Symposium in Honolulu, 1992 (Principal Investigator)  
SUNY Oswego Faculty Enhancement Grants, 1994, 1998, 2002  
International Water Lily Society Grant, 1998

#### **Professional Recognition**

Invited talks: University of Georgia, Kent State University, University of New Hampshire, Virginia Polytechnic & State University, Queen's University (Canada), University of Bristol-Long Ashton Research Station (England), University of Waterloo (Canada), 4<sup>th</sup> Annual Conference of the Empire State Association of Two-Year Biologists at Syracuse. Invited symposium organizer for 2003 annual meetings of Botanical Society of America, Developmental and Structural Section, in Mobile, AL. Invited Symposium Organizer: 1999 XVI International Botanical Congress (Physiology and Anatomy of Roots in Wetland Environments), St. Louis, MO. Invited symposium speaker: 1987 XIV International Botanical Congress, Berlin, Germany. Who's Who in Frontier Science and Technology (1985); Who's Who: Environmental Registry (1992); Who's Who in Science and Technology (1993); Who's Who in the East (1993); Vice-Chairperson (1977-8) and Chairperson (1978-9) of Structural Section and Program Director (1994-7) of Developmental & Structural Section of Botanical Society of America.

Just since Jan 2000, professional, scholarly service as a referee in the review of numerous research articles for such journals as American Journal of Botany, Annals of Botany, Canadian Journal of Botany, International Journal of Plant Sciences, Iran Journal of Agricultural Research, Journal of Experimental Botany, Journal of the Torrey Botanical Society, New Phytologist, and Environmental & Experimental Botany (as Editorial Board member).

Invited contributor of cover photo on the January 1999 issue of the Canadian Journal of Botany; use of that cover photo as the home page photo for the Canadian Journal of Botany web site from 1999 thru 2001. Invited contributor of many photos in scholarly books and a review article.

Outside examiner and committee member for doctoral student and masters student in biology at Carleton University and University of Waterloo, Canada.

### **Teaching**

Courses taught in the last 20 years (most Problems in Biology also had 1-3 graduate students): Environmental & Population Biology; Plant Kingdom; Plant Anatomy and Morphology; Morphology of Non-Vascular Plants; Developmental Biology; Plants and Society; Topics in Modern Biology: Ecosystems in Jeopardy; Cytohistotechniques; Current Issues in Biology: Conservation; Biology of Sex; Introductory Biology; General Biology; Trees and Shrubs (undergrad and grad); Developmental Biology of Plants (grad);

Problems in Biology (undergrad and some grad): Plant Development, Evolution & Education, Plant Tissue Culture, Plants and Acid Rain, Pollutants and Plant Development, Plant & Animal Histological Techniques, Plants in Polluted Environments, Plant Morphogenesis, Plant Growth & Development, and Plants, Pollution, & Environment.

Many of my students have gone on to graduate schools and professional careers in botany or related biology disciplines.

### **Service**

Department advisement coordinator for several years in 1970's; member, Student Affairs Council; chair, Department of Biology, 1979-1985; member of numerous departmental committees during 1970's; producer of minority, biology Self-Study in 1998 and Biology Brochure in 2001; member review committee for Explorations in the Natural Sciences; teacher in Sheldon Institute for Gifted and Talented Children (few years in early 1980's and again in early 1990's); men's cross country coach, 1982-5, and unofficial assistant with track & field, tennis, and cross country teams in 1970's; Oswego Nursery School Publicist in 1970's; leader of numerous field trips elementary school classes for nature studies; double bass player with Oswego College/Community Orchestra, 1991-2001; trombonist with Oswego Concert Band 2002-; various leadership positions with Structural/Developmental & Structural Section of the Botanical Society of America. I've been a major protector of academic rights, academic freedom, and academic and scholarly standards at Oswego and in Biology.